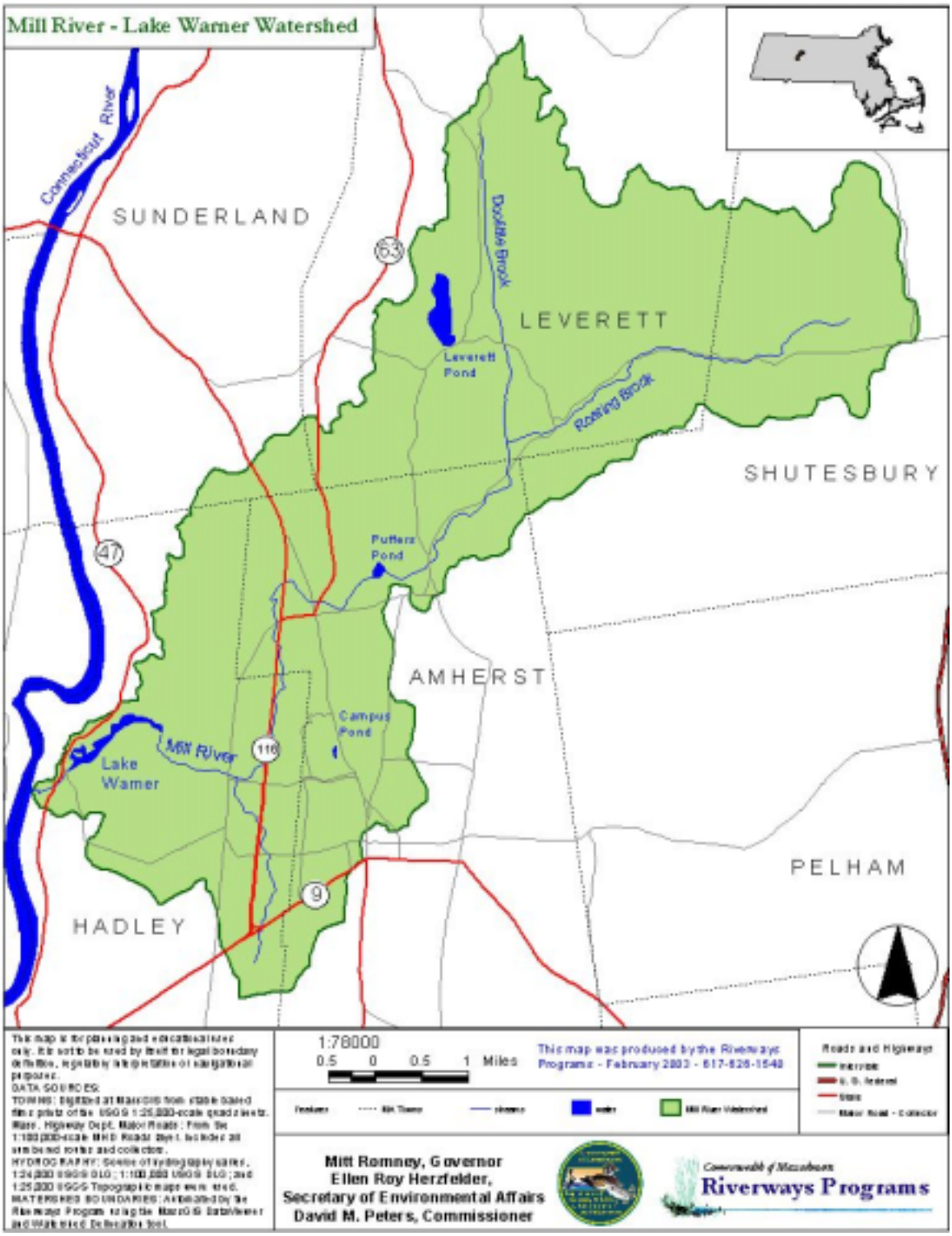
WATERSHED SURVEY
FINAL REPORT & ACTION PLAN

LAKE WARNER / MILL RIVER WATERSHED

AMHERST, HADLEY, LEVERETT, AND SHUTESBURY, MASSACHUSETTS

FALL 2002 – WINTER 2003

IN COOPERATION WITH THE MASSACHUSETTS RIVERWAYS PROGRAMS
DEPARTMENT OF FISHERIES, WILDLIFE & ENVIRONMENTAL LAW ENFORCEMENT
LAKE/WATERSHED STEWARDSHIP PROGRAM


Mill River - Lake Warner Watershed
Connecticut River
SUNDERLAND
Dogtail Brook
LEVERETT
Leverett Pond
Rolling Brook
SHUTESBURY
Puffers Pond
AMHERST
Campus Pond
Mill River
Lake Warner
PELHAM
HADLEY
63
47
116
9
1:78000
0.5 0 0.5 1 Miles
This map was produced by the Riverways Programs - February 2003 - 617-626-1540
Roads and Highways
Mitt Romney, Governor
Ellen Roy Herzfelder,
Secretary of Environmental Affairs
David M. Peters, Commissioner
Commonwealth of Massachusetts
Riverways Programs

Lake Warner / Mill River Watershed Survey Final Report

Survey Participants:

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Steering Committee:

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Lake Warner /Mill River Watershed Study Group
Fall 2002 Survey of Water Runoff
Report Summary

The Lake Warner/Mill River Watershed Survey group met in several sessions in Oct-Dec. 2002 to plan and execute a visual survey of the land along the banks of the lake and the various streams that comprise the watershed -- which is contained in the towns of Hadley, Amherst, Leverett, Shutesbury, and Sunderland. This work is part of a process being used statewide by lake and watershed groups as part of the Massachusetts Riverways Programs' Lake/Watershed Stewardship Program. A prime motivation was concern about the continued degradation of Lake Warner and the streams that feed it. There seemed to be consensus that silting and runaway plant life was threatening the health of this valuable watershed. Without intervention Lake Warner, for example, seems destined gradually to become a swamp.

In the last two weeks of November we conducted a survey, using data sheets and protocols developed by Riverways, which involved various people from the group walking and canoeing around the portion of the watershed in Hadley and Amherst, including the UMASS campus, seeking to document visual observations of potentially damaging runoff and issues that needed to be addressed.

We found some good things:

- A lake, streams, wetlands and protected forests that are home to a variety of wild life and plant species as well as being an attractive site for hiking, fishing, boating and winter sports.
- There seemed to be a good buffer of plants and berms protecting most of the shore of Lake Warner from undesirable runoff.
- Farms that appeared to be making efforts to use "Best Management Practices" to manage their manure and fertilizer runoff.
- At least one commercial establishment that appeared to be making the attempt to control parking lot runoff

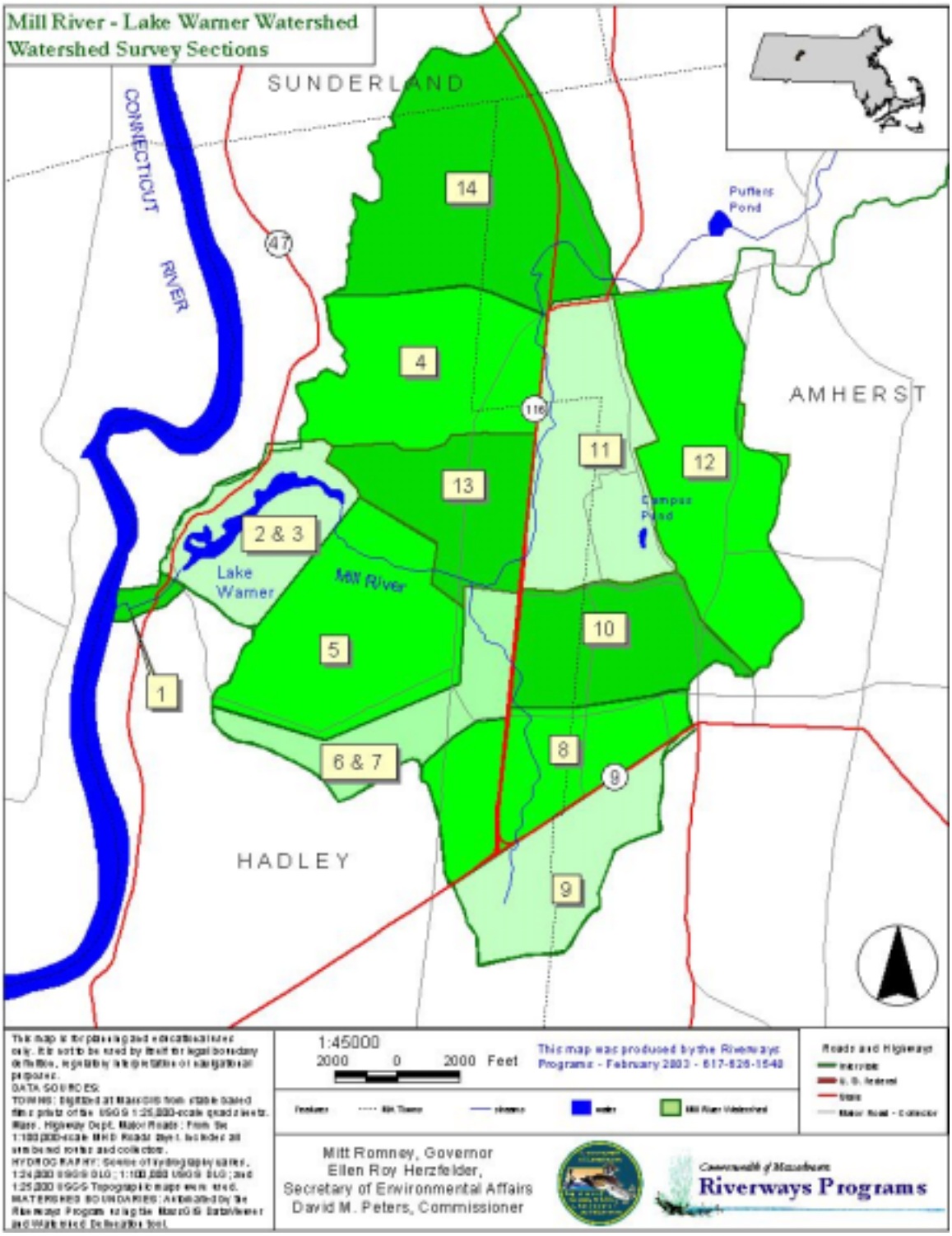
We also found causes for concern:

- Livestock manure and piles of organic material near streams
- Commercial parking lots which drain into wetlands
- Leaves, agricultural produce and other material dumped into the lake or stream
- An upstream pond with many Canada geese, and lack of shoreline buffering
- Continued evidence of duckweed and other invasive plants
- New construction that was not protected from erosion
- A few instances of trash and other discarded materials

We found things that need more investigation and further action:

- Ways of addressing problems of nutrients and silting in Lake Warner.
- Water quality monitoring to determine both the extent of nutrient oversupply and its origin.
- The impact of runoff from commercial establishments along University Drive and Route 9. Are the wetlands a sufficient buffer for parking lot runoff?
- The destination of storm drains outfalls and their impact on the watershed. Can they be improved?
- How best to educate landowners on Best Management Practices.

Following the survey, volunteers and town officials met at a meeting facilitated by the Lake/Watershed Stewardship Program to develop an action plan. We are hopeful that the survey will lead to other investigations and ultimately to some action that will result in a cleaner, healthier system of streams and ponds. To that end we are continuing to meet with members of other interested groups and individuals.


Mill River - Lake Warner Watershed
Watershed Survey Sections
SUNDERLAND
CONNECTICUT RIVER
47
Puffers Pond
14
4
AMHERST
116
11
12
13
Campus Pond
2 & 3
Lake Warner
Mill River
5
10
1
6 & 7
8
9
9
HADLEY
1:45000
2000 0 2000 Feet
This map was produced by the Riverways Programs - February 2003 - 617-626-1540
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Lake Warner / Mill River Watershed Survey Area Summary Sheet Narratives:

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Date: 11/24/02 **Survey Section**: 1 Mill River From Dam to CT River
Surveyors: Glenn, Tom, and Sandy Clark
Today's Weather: cloudy mid 30's
Weather over past 24-48 hours: High 30s-40s Lows 20s – 30s - .5" – 1" rain

This area lies on either side of the lower reach of Mill River from the dam on Lake Warner to the Connecticut River. Several road drains (via pipes & culverts) empty directly into the river and there are some drains, presumably, from residential lots. Along French Street there is a catch basin that gathers some road runoff but also water from a seep/spring in hillside above which is channeled into River. Agricultural land is adjacent to River but is separated by a vegetated buffer and this year anyway was cover-cropped.

Date: 11/ 23,25 /02 **Survey Section**: 2 & 3 Lake Warner
Surveyors: Jim & Gerry Harvey, Ginger Goldsbury, Jim Freeman
Today's Weather: Overcast
Weather over past 24-48 hours: 1/3 inch rain

First we surveyed the shoreline of Lake Warner by canoe. The northwest shoreline is a mixture of residential, agriculture and brush/woods. Nearly all of it has a buffer of at least 20 feet of brush and trees, with most areas having considerably more. A couple lawns go to water's edge, but they did not seem to be heavily fertilized. Two tilled fields are fairly close to the water, so fertilizer runoff is a possibility. Much of the shoreline has vegetation growing in the water near shore. Not much has overhanging trees.

The southeast shore is mostly wooded, with considerable tree overhang. The southern 30% has an apple orchard – largely untended the past few years -- which is located on a moderate to steep slope. There is a wide buffer (100-200 ft.) of brush and woods nearest the shoreline. We saw occasional patches of duckweed remaining from the summer when it nearly covered the lake.

On the second survey, we walked south along the shore from the Congregational Church, over the bridge, and along the shore of the apple orchard. There is a boat launch near the bridge with drainage from the road emptying directly into the lake. The boat launch itself is probably a source of oil, gasoline etc from vehicles launching boats. Some boats have small motors which is doubtless an additional cause of pollution.

Along the shore of the apple orchard, we found three large gullies (channels??), the second of which had running water which came from under ground, crossed over 100 ft of soil, entered the ground and after 50 ft. or so, emptied into the lake. It appeared to be spring fed, though that could not be verified.

In general, there did not appear to be very much evidence of a large amount of unbuffered drainage into the pond.

Date: 12/04/02 **Survey Section**: 4. 1st Tributary (from the north), Knightly Rd, etc
Surveyors: Micki Sanderson
Today's Weather: cold, cloudy
Weather over past 24-48 hours: Cold, snow

We surveyed the stream and ditches built in 1982 by the USDA. The stream is only "natural" for about 100 yards north of Knightly Rd, then becomes a clear cut series of drainage ditches. The ditches had 6" to 1" of water which looked clear and was flowing slowly, no smell or algae, with

grasses and a well-established vegetable buffer – many birds also. No yard waste – all cow waste is controlled by added fences – no cows enter the streams or use them in any way. There are grass strips before the fences providing a buffer and sediments from the farming and do not enter the ditches either. No problems noted except with the culvert.

Date: 11/24/02 **Survey Section**: 5. Mill River upstream from L Warner, 2nd Trib (from the south):
Surveyors: Tom, and Sandy Clark
Today's Weather: cloudy mid 30's
Weather over past 24-48 hours: High 30s-40s Lows 20s – 30s - .5" – 1" rain

Area #5 is a diverse area that contains a section of the main stem of the Mill River just East of where it spreads out to become Lake Warner. Also contained is a sluggish tributary that drains from S to N the Eastern flank of forested Mt. Warner and a large area of fallow agricultural land that is comprised of wet meadows, meadows and fields in various stages of succession. On the Southern and Southeastern periphery is residential development. Dairy farms at the corners of Mt. Warner Rd. and Breckenridge Rd. and N. Maple St. and Mt. Warner Rd. operated in the not too distant past.

Date: November 26, 2002 **Survey Section**: 6. & 7. Breckinridge Rd, Huntington Rd, Cemeteries: MAWWP
Surveyors: **Jerry Schoen & Marie-Francoise Walk**
Today's Weather: cloudy mid 30's
Weather over past 24-48 hours: High 30s-40s Lows 20s – 30s - .5" – 1" rain

Sections 6 and 7: South side of Mount Warner Road; North Maple Street near Mt. Warner Road; UMass horse farm and land just downstream (to Massachusetts Avenue); Rt. 116 near horse farm.

We discovered one house being built on Mount Warner Road, with a driveway built to subdivision standards (to accommodate extra building lot), which had no erosion control measures in place. The land drains to a ditch alongside Mount Warner Road – the nearest stream is perhaps ½ mile away, but it still appears that sediment may eventually reach the stream, which drains into Lake Warner. At the very least, this situation may cause maintenance problems for the Hadley DPW, because the roadside drainage ditch may become clogged with sediment.

A cemetery at the intersection of Rocky Hill Road and North Maple Street contains leaf cuttings and similar waste material, along with a fair bit of earth fill, atop a rather steep bank. This is immediately adjacent to a drainage swale that becomes a stream about 150 yards downslope. We did not consider this to be a priority problem, but it might be worth communication with the maintenance crew for the cemetery to ensure that practices do not threaten the watershed.

At the intersection of Massachusetts Avenue and North Maple Street is a wetland that has aesthetic appeal and which is a great place to observe waterfowl, herons and other avian and other wildlife. A stream runs through this area. This land is immediately downstream of the UMass horse farm. The stream runs through the horse farm. The farm actually contains horses, cows, pigs, sheep and goats. Of all the sites we surveyed on this day, we considered the farm to be the most significant probable contributor of nutrients and bacteria to the Lake Warner drainage. There are at least 2 pastures that drain towards the stream with little distance to travel or vegetation or other barriers to prevent runoff (i.e. animal waste) from entering the stream. There were one or 2 apparent holding pens, shelters, or feeding pens where animals apparently concentrated for some periods of time, although they were not doing so now. These were within 50 feet or so of the stream with very little buffer between these areas and the stream. There was at least 1 pasture where horses and cows had uninhibited access to the stream, along a stream

length of approximately 300 yards or more. This farm appears to be a prime candidate for implementation of best management practices to minimize runoff.

Route 116 is a divided highway in this stretch. The strip of land separating the north and southbound lanes (approximately 30 feet wide) is largely grass-covered. However, runoff collects in storm drains that drain directly to the stream that flows through the horse farm. Although an improved storm runoff management system would be nice, this should probably be a low priority, given the large price tag likely to do something effective, and the existence of numerous other more serious problems in the watershed.

Date: 11/26/02 **Survey Section**: 8. "Fish & Wildlife" Brook, Rte 116, North side of Route 9: MAWWP
Surveyors: Jerry Schoen & Marie-Francoise Walk
Today's Weather: cloudy mid 30's
Weather over past 24-48 hours: High 30s-40s Lows 20s – 30s - .5" – 1" rain

Section 8: Route 9 and lands north, to Amity Street / Rocky Hill Road, North Maple.

The areas of greatest concern in this section are the parking lots and buildings along Route 9 (i.e. Stop and Shop and neighbors) and University Drive. The Stop and Shop parking lot appears to drain directly into a wetland that eventually drains to the stream going to the UMass horse farm and thence to Lake Warner. There appears to be no treatment of the runoff. It may be that the wetland attenuates whatever pollution is coming from this area, as it appears to be a rather large wetland. The pipe transporting runoff from the S&S parking lot was partially collapsed, partially filled, and releasing oily water into the wetland. It might be wise to sample this runoff for Volatile Organic Compounds. In addition, a couple of minor problems might be looked at: What appears to be a communication tower was installed recently behind S&S. A silt fence from that construction was never removed. Also, some bare earth from the project may be contributing sediment to the parking lot and thus to the wetland. This should be looked at in the spring to see if the area has been revegetated.

University Drive:

The Big Y parking lot appears to drain into a retention basin. This appears to be an effective means of controlling runoff from the lot. However, the CVS store adjacent to Big Y appears to have storm drains that discharge directly to a stream/wetland. Some oily sheen was observed on the water in this wetland.

A new office building that houses the UMass Telecomm offices (among other tenants) and which is near the post office has some silt fences that appear to be controlling runoff from parking lot construction effectively – except that one section of the silt fence ends abruptly, and there is some bare earth (although it may have been seeded) that seems to drain into the adjacent wetland. However, there may be some earthen berms in place that separate the parking lot from the wetland, with an intervening strip of land that may serve as a detention basin. It was hard to tell. At the back end of the paved parking lot is a gravel lot, which perhaps is intended as overflow parking, or perhaps has been cleared in anticipation of future building projects. This lot seems to be constructed right to the very edge of a wetland, with no buffer zone. It bears further investigation.

A condominium complex on the north side of Amity Street has one section where lush green lawns slope down to a wetland. This is not a large area, but it might be worth it to communicate with the property manager about avoiding use of fertilizers along this strip of land.

Survey Section: 9. Headwaters of "Fish & Wildlife" Brook, South side of Route 9
Surveyors: Dave Ziomek

This section is located just south of Route 9 and is characterized by extensive commercial and retail development on this major east/west highway between Amherst and Northampton. The small section in Amherst is noteworthy because it is on a west-facing slope and contains part of the Amherst College Campus. Adjacent to the campus lands are many small residential streets. Most of the land base is located in Hadley. Historically, this area was part of a much larger agricultural block of land known for dairy farming. Although quite wet, it provided excellent pasture land for local dairy farmers and some small farm fields remain today. Since the construction of the first mall in the 1970's, the area has been steadily built up with stores, gas stations, restaurants, and most recently hotels. More development is being planned and will only increase the amount of impervious surface and the volume of run-off in the area.

There is one small tributary stream that runs south to north through this section of the Mill River Survey. Most of the run-off from streets, parking lots and roofs eventually makes it into this stream- taking the water under Route 9 behind Stop and Shop. The original steam channel has been extensively changed by historic agricultural practices and more recently by development. The banks of the stream and adjacent wetlands are overgrown with non-native invasive species.

Along the back of Section 9 where the Norwottuck Rail Trail comes through remains some interesting wooded wetlands including some vernal pools.

Date: 12/1/02 **Survey Section**: 10. South half of UMass Campus, Downtown Amherst
Surveyors: **JP Kwiecinski**
Today's Weather: Cold, partly cloudy
Weather over past 24-48 hours: 3 inches of snow (last 24 hours)

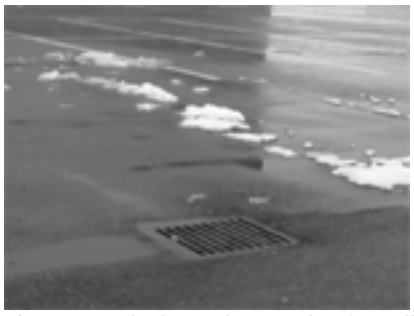
We surveyed the south side of UMASS, including southwest, and the north half of downtown Amherst. There are two streams running through the area, one to the west of Alumni Stadium (UMASS football field) and one running from McClellan Street to the southern edge of the parking lot, near the visitor center, off Massachusetts Avenue. The area includes the most densely populated section of Western Massachusetts (Southwest campus with 5, 20+ story high rises as well as numerous low-rise residential housing) as well forest, wetland, residential housing and a commercial downtown main street.

Perhaps the clearest example of direct flow of discolored water into the wetlands is evident near the south side culvert off the jogging track west of Alumni Stadium (photo #1 and #2.

2) Discolored water entering wetlands from culvert on the south side of the jogging trail west of Alumni Stadium.

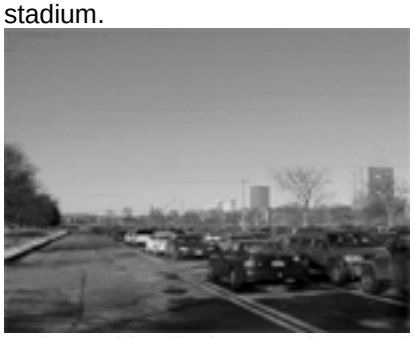
3) Murky water merges with clear water in streambed west of Alumni Stadium

4) Source of discolored water discovered just south of Alumni Stadium where storm drain receives the runoff from a trap rock parking lot.



5) Storm drain to the north of stadium receives water not discolored with sediment.

One potential problem area is the runoff from the parking lots, parking lots, and more parking lots in this survey area. The runoff here enters storm drains and enters directly into the streams just north of the alumni stadium.



6 A) Parking lot just southwest of Southwest Towers (UMASS):
Another potential problem area is the proximity of the dumpster and parking lot behind a fraternity on Pleasant Street, Amherst to the stream running from McClellan Street to just south of the visitor parking lot off Massachusetts Avenue.

11) Just north of this site is another area of concern where a storage shed rests right on the lip of the stream. This site was accessed from Lincoln Street (where the married student housing once was). Go around back. When you arrive, you will be at the rear of 85 Fearing Street.

11) Rear of 85 Fearing Street property.

These trees have fallen into the stream between Fearing Street and Pleasant Street offering squirrels an excellent opportunity to cross the waterway.

9A) Either soil caves into the stream on the north side of Massachusetts Ave.
just east of the intersection of Mass Ave. and Mullins Way or the snow has covered a concrete culvert (something to check out at another time).

9) Keep an eye on the culvert under Mullins Way where rock used
in rip rap has collected in the bottom of the culvert.

12) In the stream just north of Fearing Street there appeared to be a discoloration like green algae on the rocks. Sorry, no photo available.

13) Finally, keeping an eye on the overgrowth of culvert #1, just off Rocky Hill Road may be a good idea since the grasses have overgrown the culvert and threaten to impede the flow.

Date: 11/24/02 **Survey Section**: 11. North half of UMass Campus
Surveyors: UMass Students
Today's Weather: cloudy
Weather over past 24-48 hours: cloudy, foggy, rainy

UMASS, which is mostly paved, takes up a large amount of our area. Residential areas such as Puffen Townhouses and Brandywine take up a lot of the rest. They are also mostly paved. The rest of the area is woods or roads, some wetlands and fields near the river. There are two dirty ponds, the campus pond and the Brandywine pond.

Date: 12/02 **Survey Section**: 12. Amherst Schools, residential areas
Surveyors: **Nate Frey**
Today's Weather: clear
Weather over past 24-48 hours: clear

Section 12 is a mostly residential and partly rural section with a small percentage made up by the UMASS Campus and the north end of downtown Amherst. There are two trib's and the campus pond, all with problems ranging from low flow to obvious non-point source pollution. There was no evidence of point-source or invasives. Implicating better buffers is the appropriate action for this section.

Date: 11/ 22-23 /02 **Survey Section**: 13 Stockbridge Road, Roosevelt St. Area

Surveyors: Jim & Gerry Harvey
Today's Weather: Overcast
Weather over past 24-48 hours: 1/3 inch of rain

This section is a largely agricultural area, through which the Mill River runs, as well as two tributaries – one coming from the north under Knightly and Stockbridge roads, the other coming from the south along 116 and crossing under Massachusetts Ave. There are a couple dozen residences along Knightly and Stockbridge roads. There is a portion of wetlands in the southern portion of the section.

Our first survey took us along Knightly and Stockbridge roads, paying special attention to the tributary that goes under both roads from the farm fields and pastures to the north. It seemed to be fairly clear, but with some residual duckweed in evidence. We noted that both Knightly and Stockbridge had storm sewers that seemed to run into the tributary, though that was not totally certain. A second survey trip took us along Mill St, Roosevelt, N. Hadley Rd (aka Mass Ave) and Maple. We noted storm drains, but could not determine where they went. Also we found pipes at the intersection of Roosevelt/Maple and N. Hadley Rd (aka Mass Ave) which empty directly onto the slope to the Mill River and the wetlands near it. These seem likely to carry some road runoff directly into the watershed.

There are two dairy farms on this section, one near the northerly tributary, the other near the Mill River itself. There was evidence that an effort had been made to reduce manure runoff, though it was not clear if cattle could still enter the water or the land along the streams. A large pile of what seems to be organic material sits near Highway 116, not far from the Mill River. A drainage ditch appears to bring runoff into the Mill River. One area of the apparently sandy riverbank on the north side of N. Hadley Rd (aka Mass Ave) is being eroded away by the river.

Survey Section: 14. Agricultural lands north of Section 4
Surveyors: Dave Ziomek

Section 14 is located north of Lake Warner and contains land in Hadley, Amherst, and Sunderland. It is bordered by Rt. 116 to the east, Shattuck Road to the west, Plumtrees Road on the north and Cumins Road on the southern border. Most of the land base is still in agriculture but residential uses are on the increase, especially on the Hadley/Sunderland town line. Land along Rt. 116 contains some industrial, commercial and retail establishments.

The remaining farm land is quite spectacular. Between active fields there is often extensive forested tracts that are used by farming families for fire wood production. Two tributaries of the Mill River drain extensive areas in this section. Both have been seriously impacted by agricultural activities including ditches, channelization, dams, bridges, and culverts. A large part of this area is known as the "Great Swamp" referring to the once extensive wet meadows and woodland swamps that once characterized the region.

Given the undeveloped nature of this section, it is considered excellent habitat for many species of wildlife including dear, bear, turkey, coyote, and many species of field and marsh birds. The extensive wetland areas are also home to many species of reptiles and amphibians.

Habitat along the tributaries and mainstem of the Mill River consist of early successional trees and shrubs and some more mature hardwoods. Farm fields are often planted to within just a few feet of the water ways. As a major state highway, Rt. 116 cuts through this section and parallels the Mill River for much of its run to north Amherst. Run-off and salt from Rt. 116 must be considered to have a significant impact on water quality during the winter months and storm events. The impact of agricultural activities is also something that needs more study.

Priority Sheets Lake Warner / Mill River Watershed Surveys November 2002		
Problems Found	**Natural Resources and Assets Found**	**Priorities for Action**
Section 1 - Mill River from dam to Conn. River, *Glenn Clark, Tom & Sandy Clark* 1. Road runoff possibly 2. Invasive species along lower half of Mill River Section 3. Trash along banks	1. Wildlife habitat 2. Banks fairly well stabilized with vegetation	
Section 2 & 3 – Lake Warner, *Jim Freeman, Ginger Goldsbury, Jim & Gerry Harvey* 1. Study stormdrains – are there ways of delaying and buffering storm runoff from River Dr, Lake Warner Rd, and Stockbridge / Knightly. 2. Leaf dumps from some residents and town of Hadley (ballfield in N Hadley).	1. A variety of wildlife is found on and around the lake. There is a good variety of habitat ranging from brush, to meadow & marsh. 2. It's a lovely lake for kayaking and some fishing.	1. Road runoff 2. Storm sewers
Section 4 – 1st Tributary from the north, Knightly Rd, Comins Rd, Meadow St, *Micki L. Sanderson* 1. Culvert on Knightly has no buffer allowing salt and silt to be deposited in stream.	1. Excellent preventative measures taken by John Devine and J. Zgrodnick and area farmers.	1. Buffer zone and barrier around culvert.
Section 5 - Mill River upstream from Lake Warner, 2nd trib, Maple St, Mt. Warner Rd, Plainville, *Tom & Sandy Clark* 1.	1. Excellent wildlife habitat through large part of section – good diversity 2. Significant vegetated buffer	

Section 6&7 – Breckinridge Rd, Huntington Rd, Cemeteries, *Jerry Schoen, Marie-Francoise Walk* 1. Horse farm drains to stream – little to no buffer, animals w/ access to stream, bare earth, manure w/ easy drainage to stream. 2. Cemetery – brush, dirt, waste "hill" with steep slope, adjacent to headwaters of a stream (no flowing water, but there is some approx 150 yds "downstream") 3. House / street construction – erosion potential high. 4. Rt 116 – pot runoff to stream that runs thru horse farm.	1. Nice wetlands. Great birding opportunities	1. BMPS on horse farm. 2. BMPs on construction site.
Section 8 – "Fish & Wildlife Brook," Rte 116, North side of Route 9, *Jerry Schoen, Marie-Francoise Walk* 1. Stop&Shop parking lot drainage to wetland. Little to no border. Oil w water below drain. 2. Similar Pkg lot / wetland drainage w/ oil sheen on water at CVS. 3. Some bare earth at border of S&S parking lot - -vegetation needed? 4. Remove old silt fences from behind S&S lot – at the communication tower. Also from Frontage Rd near post office. 5. Pipe & roof drains ? Discharge near wetland at nursing home. 6. Silt fence poorly constructed / missing from parking lot behind Telecomm bld ? Drain to wetland or detention basin? 7. Peastone parking lot behind Telecomm apparently a wetland violation. 8. Condos off amity – lush lawns drain directly to wetland.	1. Lots of wetland. Probably significant pollution filter effect & good wildlife habitat.	1. Alert Concom about parking lot and wetland. 2. Check vegetation (spring) at border of S&S Parking lot 3. Remove old silt fences at S & S parking lot 4. BMPs at S& S Parking lot. 5. CVS 6. Outreach – ed to condo owners → avoid fertilizer on that slope.

Section 9 – Headwaters of "Fish & Wildlife Brook," South side of Route 9, *Dave Ziomek* 1. Development on/around Westgate Drive has increased impervious surfaces and run-off to tributaries of Mill River 2. Plans for additional commercial/residential development in the area will only add to run-off problems 3. Some agricultural run-off entering system south of Norwattuck Rail Trail 4. Area includes significant amount of very compromised wetlands full of invasive species 5. Extensive use of road salt on Rt. 9, Rt. 116 and adjacent roads may impact the Mill River	1. FWS has its regional office on Westgate Drive—possibility for education and outreach 2. There are many interested vernal pools and isolated wetlands in the area 3. Possibilities exist for Hadley/Amherst partnership to address issues of water quantity and qauality	1. Assess carrying capacity (H2O quantity/quality) of Mill River tributary running north under Rt. 9 2. Explore working with area businesses/Hadley Cons. Commission to use more retention basins to off-set run-off from area roadways and parking lots
Section 10 – South half of UMass Campus, Downtown Amherst, *JP and Meagan Kwiecinski* 1. Discolored water draining from UMass trap rock parking lot into wetlands west of Alumni Stadium. 2. Potential problems off Pleasant and Fearing. 3. Algae on rocks south of McClennan Street.	1. Jogging trail along wetlands west of Alumni Stadium. 2. Residential Area – runoff from gutters go into yards for the most part.	1. Determine runoff from stadium is a problem for wetlands area. 2. Keep an eye on stream between Pleasant Street and Fearing Street to see if debris from storage shed and from dumpster enters stream. 3. Review to see any changes in extent of algae. 4. Examine storm drain runoff in spring to see if any oil is detected from extensive parking lots off University Drive and Massachusetts Avenue. 5. Review university practices for keeping green area around Alumni Stadium.

Section 11 North half of UMass campus, *MCWW student volunteers* 1. Pipe draining into River from Campus Pond 2. Silt barrier still up near Puffton. Seems like it could be removed w/out causing a problem 3. Puffton dump located near the river.	1. Good fish & wildlife hiding spots in river (exposed banks w/ roots exposed) 2. Open wetland 3. We saw deer tracks 4. Thick vegetation on both sides.	1. Campus pond & drainage pipe 2. Puffton dump (located behind apartments 280 – 285)
Section 12 - Amherst Schools, residential areas, *Nate Frye* 1. Erosion, obvious runoff problem from highly trafficked road. No vegetation downstream of culvert. 2. Runoff into campus road.	1. Most of the tributaries in residential to slightly urban areas, yet with good buffers - for the most part - in place. 2. Eastern watershed boundary on top of ridge – steep gradient with lots of impervious surface – but an obvious attempt to "filter" drainage with vegetation ; steepest area "preserved" in cross country trail section by Eastman.	1. Vegetation buffer to for banks along tributary – especially by road. 2. More vegetation on pond – maybe silt fences or other measures as well.
Section 13 – Stockbridge Rd, Roosevelt St area, *Jim & Gerry Harvey* 1. Most land in Section 13 is cultivated farmland including horses & cows. Potential runoff from fertilizer, pesticides, & animal waste. 2. Active roadways pass through land – MA Rte 116, Roosevelt & Stockbridge – not clear where storm sewers drain to. At intersection of N Maple, Roosevelt & Mass Ave had 3 direct drains to wetlands.	1. At least 2 access routes to fishing in Lake Warner / tributaries (Mill St behind homes on Stockbridge) 2. Mt. Warner visible from entire area 3. Migration path for several species.	1. Determine disposal destination of storm sewers 2. Determine if runoff from organic material handled adequately.

Section 14: *Dave Ziomek* 1. There is significant erosion on the main stem of the Mill River 2. Cattle still graze near/in the Mill River and its tributaries 3. Many acres of farmland are unprotected and at risk for development 4. Storm water management is an issue in North Amherst 5. In/around North Amherst there is almost no vegetated buffer along the main stem 6. Agricultural run-off remains an issue	1. Area includes extensive agricultural lands north of Cumins Rd 2. Many acres of farmland have been perm. protected through the APR Program 3. The Podick and Cartherine Cole Wildlife Sanctuaries are in this focus area 4. The area provide excellent habitat for many species of wildlife	1. Address issue of livestock in/near river 2. Assess run-off issues in North Amherst center 3. Assess possibilities for additional land conservation issues in Section 14

Lake Warner Watershed Action Plan

RECOMMENDATIONS FOR ACTION

Based on the November 2002 Watershed Survey of the Lake Warner Watershed
and the December 2002 Action Planning Meeting, Facilitated by the Riverways Program

A. REPORTING

1. To Hadley Parks & Recreation

Section 2 – North Hadley Ballfield – Town has been dumping leaves and lawn waste directly in water. Request appropriate composting methods and location be chosen.

2. To Planning Board & Conservation Commission

Section 6 & 7 - Report lack of erosion controls at subdivision on MT Warner Rd Street

3. Agriculture

Section 6 & 7 - UMass Horse Farm – Collaborate with farm operators on use of best management practices to address issues including livestock in the water, lack of erosion controls, runoff issues.

4. To Conservation Commission

Report runoff from Telcomm building on University Drive: parking lot & concerns regarding the adjacent wetlands. Gravel parking lot appears to be located too close to wetlands.
Report old silt fence at Stop & Shop parking lot that needs to be removed.

5. UMass Campus & Surroundings

Section 11 - Puffton Village (private housing with large student population) - Report trash dump
Section 11 – Whitmore Adminstration building – Runoff problems from nearby construction

B. SHORT TERM

1. Departments of Public Works

Coordinate with Department of Public Work to improve stormwater management.

- Section 1 –BMP needed for currently untreated road runoff to Mill River downstream of the Lake Warner dam.
- Section 2 – Seek ways to improve infiltration/ buffering of stormwater from catch basins along Stockbridge Road, River Drive, Mount Warner Road, and from River Drive bridge below the dam.
- Section 4 – Improve stormwater management, repair culvert at Knightly Road crossing of tributary. Current lack of vegetation, erosion problems, culvert in poor repair.

Before seeking grant money, revisit these sites with DPW staff and 1) Prioritize problems 2) identify BMPs which might work on the problems. Then research grant money to fund construction of structural Best Management Practices at chosen problem areas.

2. Water Quality Monitoring

Develop water quality monitoring program throughout the watershed on tributaries. Specific trouble spots recommended for monitoring include:

- Section 4 – Knightly Road crossing of tributary. Parameter: nutrients
- Section 6 & 7 – UMass Horse Farm. Parameters: nutrients, bacteria
- Section 8 – Stop & Shop parking lots' stormwater outlet to adjacent wetland, CVS Parking lot stormwater outlet– Parameters: Volatile Organic Compounds (VOCs) metals, TSS, nutrients
- Under Rocky Hill Rd – south of stadium VOCs, Nutrients
- Section 10 – Tannery Brook from McClellan Street. Parameters: Nutrients, VOCs?, bacteria, macroinvertebrates.

- Inlet to L. Warner: Nutrients, bacteria. VOCs Lake Sediment: Metals.

3. Agriculture

Work cooperatively with farmers in the watershed to seek remedies to address nonpoint source pollution sources from local farms through paths that reduce impacts and support farmers' ability to finance and construct viable best management practices. Partner with farmers, Natural Resources Conservation Service, Hampshire Conservation District, MA Department of Food and Agriculture, and local municipalities.

- Section 6 & 7 –UMass Horse Farm – Work with operators on issues including livestock in the water, lack of erosion controls, runoff issues. *See similar language above.*
- Section 13 & 14 – Several farms in section 13, farmland near auction site in section 14 - Communicate with farmers with erosion problems, runoff issues, and on concerns regarding livestock being watered in streams. Explore management options, grant money.

4. Commercial Concerns

Several local businesses have been identified as having poor stormwater management from parking facilities, while others serve as good examples. Work with business owners to promote examples of good stormwater management, and plan upgrades on failing stormwater systems where feasible. Include efforts as part of greater outreach campaign to elevate visibility of the lake in town. Specific problem areas identified include:
Section 8 – Route 9 Issues, talk to businesses about stormwater management – Stop & Shop, CVS Outreach campaign might also point out examples of good stormwater management – e.g Big Y.

5. Best Management Practices (BMPs)

Work with municipal, campus, business and other partners to plan development of Best Management Practices to abate stormwater pollution.

- Section 6 & 7 – UMass Horse Farm – Install BMPs to address runoff problem, employ alternatives to practice of watering livestock directly from stream.
- Section 8 – Stop & Shop & CVS – Install BMPs that effectively buffer stormwater and allow proper infiltration.
- Section 11 - UMass Campus – Work to reduce impacts of runoff from unpaved parking lots south of the stadium
- Inquire w/ UMass about athletic fields maintenance practices (fertilizers, pesticides, runoff concerns).
- Section 12 – Eastman Lane – stream crossing has erosion problems, bare earth, no vegetation. Plant vegetation at road crossing and downstream along tributary.
- UMass Campus Pond - Plant vegetation on shoreline to discourage Canada geese from using the area. Include outreach campaign targeted to students, residents, visitors who feed the ducks & geese.
- Stormwater Bylaws for Hadley & Amherst – Push for town bylaws governing stormwater management to protect receiving waters.

6. Education / Outreach

Plan and develop education and outreach programs to elevate the visibility of the Mill River and Lake Warner among residents of watershed communities. Focus on nonpoint source pollution reduction, stormwater concerns, impacts to tributary streams – overall what residents and businesses can do to improve the health of Mill River and Lake Warner. Suggested topics include:

- Section 8 – Condominium Complex – Very lush lawns adjacent to water – provide information on the value of vegetated buffer and environmentally friendly lawn care practices.

- Link Tannery Brook headwaters (marsh) to neighboring Amherst & Wildwood schools – promote school activities that concern water quality of the marsh.
- UMass – Confer on issues in section 10 – stormwater problems relating to campus catch basin systems, parking lot runoff. Also campus pond mgt. see above.
- Homeowners – The importance of vegetated buffer as pollutant buffers, habitat, etc.

C. LONG TERM

1. Invasive upland plants

Invasive upland plants have colonized several locations in the watershed. Work to eradicate existing invasives and prevent new infestations. Grant money is available through the Natural Resources Conservation Service's (NRCS) Wildlife Habitat Incentives Program (WHIP) and other sources.

- Surveyors found invasive plants in sections 1 and 5, as well as along Route 9.
- Section 9 - Work with Hadley Conservation Commission, partner with US Fish & Wildlife to mitigate impact to tributary. Invasives (phragmites) could be kickoff effort.
- Resurvey in summer to see if purple loosetrife is present.

2. Land Protection Status – natural streams and irrigation ditches

Many natural streams have been channelized in agricultural lands for irrigation. The level of protection afforded to land along these streams may be affected by whether the Conservation Commission regards the waterway as more of a stream or more of a ditch.

3. Sediment issue – campus pond

4. Work to improve Lake Warner's water quality and protect it from greater impairments.

- Investigate dredging sediments of Lake Warner.
- Raise the visibility of the lake and Mill River through education and improvement projects.
- Implement this action plan.
- Investigat in-lake management options.

SURVEYING A LAKE WATERSHED

Data Collection Forms

GUIDANCE FOR COMMUNITY VOLUNTEERS IN MASSACHUSETTS

Data sheets based on materials from

Massachusetts Department of Environmental Protection
Massachusetts Riverways Programs, Adopt-A-Stream Program,
Department of Fisheries, Wildlife, and Environmental Law Enforcement
Massachusetts Water Watch Partnership
Maine Department of Environmental Protection

2003

Tips for Surveying a Lake and Pond Watershed

The purposes of this survey are to organize residents and officials of communities to work together to solve problems and to protect resources of lakes and ponds. The survey, a cooperative venture, is a primary step in this process. In addition, the success of the survey depends upon volunteers and landowners. Before the survey takes place, all landowners need to be invited to participate in the survey, notified of purposes of the survey, and have an opportunity to give permission for volunteers to walk their property.

This survey form is designed for use with the *Massachusetts Volunteers Guide for Surveying a Lake Watershed and Preparing an Action Plan* (2001). To ensure that the survey is successful, volunteers should be aware of the following safety tips.

Safety and Legalities

- Always walk with someone.
- Watch out for irate dogs. Walk cautiously and practice good dog etiquette.
- Do not drink the water.
- Lifejackets are required by law for each person in any canoe or boat.
- From September 15 to May 15 all canoe or kayak occupants must wear a U.S. Coast Guard Approved Personal Flotation Device.
- Wear long-sleeved shirts and pants to protect against, ticks, mosquitoes, poison ivy, and nettles.
- Wear insect repellent if necessary.
- Consider landowner rights. Ask permission to cross private land, posted or not.
- Do not enter posted areas without permission. Take advantage of public access points.

Environment:

- Don't walk on unstable banks; your footsteps could speed erosion.
- Be aware of wildlife and animal homes, for both of your sakes.

NEVER PUT YOURSELF IN DANGER TO GATHER SURVEY INFORMATION.

If at anytime you feel uncomfortable about the bank or waterbody conditions or surroundings, please STOP your survey. You and your safety are much more valuable than any of the objectives of the watershed survey.

Checklist: What to take on your survey

___ A buddy
___ Data forms and topo map
___ Clipboard or other surface for writing
___ Two pencils – color is good to mark on maps
___ Long-sleeved, snag-free clothing /pants (for bugs *and thorns)*
___ Sunblock
___ Sunglasses (polarized to see into the water better)
___ Lifejackets & paddles if canoeing
___ Camera and film
___ Gloves
___ Copy of letter sent out to landowners
___Flashlight for checking culverts

Optional

___ Rubber boots or waders
___ Yardstick or measuring tape (useful for pipes)
___ Compass
___ Field guides (in ziplock bags)
___ Food, for energy!

Fill out your data sheets, get them to your team leader, and attend action planning meeting, which will be held on: _____ Section Team Leaders will forward completed data sheets (with priority sheets) to:

Water Quality 101

Clean Water Act (CWA) – A federal law establishing comprehensive national policies for water quality management. The essence of the CWA is to have all US waters "fishable and swim able".

303(d) List – The list of waterbodies in Massachusetts or any other state that fail to meet water quality standards.

Total Maximum Daily Load (TMDL) – The greatest amount of a pollutant that a waterbody can accept and still meet water quality standards. TMDLs are established by Massachusetts Department of Environmental Protection (DEP) as the major key to remediation plans for impaired lakes and stream- the remedial plan itself is also generically called a TMDL. The U.S. Environmental Protection Agency requires that TMDLs be developed for every waterbody on the 303(d) list.

Many lakes and ponds in Massachusetts have an excess annual loading of phosphorous. Some lakes and ponds are on the 303(d) list and have TMDLs from Massachusetts DEP that call for reductions in phosphorous.

Phosphorus – A nutrient often serving as the limit to plant/vegetation growth in freshwater systems. Excessive amount of phosphorus in a water body can lead to a condition of unchecked plant and algae growth known as eutrophication.

What are major sources of phosphorous?

- Phosphorous is found in lawn fertilizers, sewarage, motor oils, and some detergents.
- Phosphorous is very abundant in stormwater runoff.
- Phosphorous binds to soil and sand particles and other sediments.

What are some ways phosphorous gets to the lake or stream?

- Picked up by stormwater and carried directly to the water overland or through storm drains.
- Scoured out with sediments by erosion.
- Leach through groundwater from failing septic systems.

Other important terms:

Best Management Practices (BMPs) – Techniques which may be nonstructural, structural or managerial capable of effectively and economically reducing nonpoint sources of pollution.

Nonpoint Source Pollution (NPS) – Pollution originating from multiple and diffuse sources – as opposed to point source pollution which can be traced to a pipe or other single, discrete source. **Storm water runoff** is a significant contributor of nonpoint pollutants since it washes pollutants from impervious surfaces such as roadways, roofs, lawns and other surfaces.

Sedimentation and siltation- An increase, above natural levels, in the amount of sand and silt carried to a water course. This increase can lead to impairments including loss of habitat, loss of spawning areas, decrease in light penetration, increase in scour and an increase in bacterial and other pollutants. Also, nutrients such as phosphorous can bind to sand and silt particles and can be carried into the waterbodies along with the sediments.

Watershed – The geographic region within which all water drains to a particular river, lake, wetland or other water body. It includes an area of land contributing all its runoff and drainage to this common point. Large watersheds may be divided into smaller sub-watersheds.

PRE-SURVEY

LAKE and POND WATERSHED **FORM**

Lake and Watershed Name: _____
Survey Area Name & Number: _____
Surveyors Names: _____

A. Description of the Area from a Topographic Map *(Maps will be available at the training session.)*

1. Consider the developed *(white)* and undeveloped areas *(green*) on your map? What % of each do you see?
   _____% developed _____ % undeveloped
2. Are there steep slopes in the sub-watershed, indicating a potential for increased runoff or erosion? (*How close together are the contour lines*?)
   ____Yes ____No
3. How many tributaries enter or cross your area?___
4. What kinds of development are shown on the map?
   (Include major development in the watershed, as well as the shoreline, that could have an impact on the lake.)

B. General Categories of Land Uses in your Area – (From general knowledge)

___ % Construction ___ % Agricultural land
___ % Residential
___ % Roads ___ *% Commercial, Industrial and Urban Areas*
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____

C. If Residential *(Estimate % of area; information will be available at the training.)*

___Multifamily ____year round
___<1/4 acre lots ____seasonal
___1/2-1 acre lots
___>1 acre

D. Is the area sewered? _____ or unsewered _____?
Do you know of any major discharges to the waterbody or its tributaries? (e.g., permitted, stormwater)

E. Watershed History and Characteristics *What do people know about this area?*

General description: _____
_____

Historical information:_____
_____

Problems to look for during site visit: *(e.g., If there is a new development near a stream, you will want to look upstream and downstream of the site for evidence of erosion and sedimentation and excessive vegetation in the stream. If you see erosion downstream of the development you may be able to track the problem back to its source.)*

1. _____
   _____
2. _____
   _____
3. _____

CONTINUE YOUR SURVEY:

- If your survey section is a **near-shore area**, continue on to the next page and fill out the near shore area field sheets (the yellow page).
- If your survey section is an **upland watershed area**, skip the next page and use the upland watershed area field sheets (the orange page).

FIELD SHEETS – NEAR-SHORE

LAKE and POND **WATERSHED SURVEY** FORM – **NEAR SHORE AREA**

Lake and Watershed: _____ Survey Date:_____
Surveyors Names: _____ Area Name & Number: _____
Weather Today: _____ Weather (past 2-5 days)_____
Landowners Contacted During Survey: ____yes ____no

A. General Categories of Land Uses Around and Upstream of Your Survey Section *(Identify the land use category on the site. May be more than one land use.)*

___ % Construction
___ % Residential
___ % Roads
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____

___ % Agricultural land
___ % *Commercial, Industrial and Urban Areas*

A.1. Specific Land Use on the Your Survey Section *(Estimate % of site in each use. May be more than one land use.)*

___commercial
___industrial
___junk yard
___railroad
___bridge
___highway
___dirt road
___local road
___parking lot
___golf course
___grazing/pasture
___park or beach
___protected open space
___undeveloped land
___meadow
___forest
___wetland
___other *(specify)*_____

A.2. If Residential *(Estimate % of site that is…)*

___Multifamily
___<1/4 acre lots
___1/2-1 acre lots
___>1 acre (*400 x 100 feet)*
___year round
___seasonal

B. Site characteristics

1. Dominant shoreline material is…
   ___gravel ___sand ___silt ___clay ___dark organic muck & peat ___other

2. Slope of site is… ___flat ___moderate ___steep

3. The shoreline or riverbank is… *(Check a or b, if there is a stream, ditch, shoreline, or steep bank on site.)*
   a)___vegetated with…
      ___exposed roots
      ___shrubs and native grasses (< 20 feet)
      ___trees taller than 20 feet
   b)___unstable and…
      ____undercut
      ____eroded

4. Vegetated Cover:
   a) How much of the near-shore water is shaded by trees and shrubs? *(estimate shading from 10 AM - 2 PM)*
      ___0-25% ___25-50% ___50-75% ___75-100%
   b) The % of the bank area that is covered by each of these vegetation types is…
      ___% grasses ___% shrubs ___ % trees (>20 feet) ___% little or none
   c) How far back from the shoreline does the band of trees, shrubs, or grasses extend?
      ___0-5 feet ___5-50 feet ___50-100 feet ___greater than 100 feet

C. Site drainage

1. **Site runoff is directly to…**
   ___lake ___stream ___ditch ___ catch basin ___vegetated buffer ___wetland other *(describe)*_____

Over

FIELD SHEETS – NEAR SHORE

LAKE and POND **WATERSHED SURVEY** FORM – **NEAR SHORE AREA**

C. Site drainage, ***continued***

2. **Site runoff is from…**

Construction: ___disturbed areas <1 acre) ___disturbed areas >1 acre ___exposed soil
___altered drainage pathways ___absence/failure of erosion controls

Residential: ___driveways ___lawns (____ <1 acre ___ >1 acre)
___lush lawns ___exposed soil ___evidence of erosion
___pet waste ___pipe drains

Roads: ___pavement to catch basin ___bridge ___shoulders/country drainage
___drainage to waterbody ___evidence of erosion ___sand build up in road
___sediment in ditches/culverts/drains

Agricultural: ___field ___animal grazing area ___manure storage area
___exposed soil ___animals in waterbody ___storage areas uncovered

Commercial, Industrial & Urban: ___parking lot ___vehicle maintenance yard ___industrial area
___waste storage area ___drain pipes to waterbody ___sediment in ditches/culverts
___paved areas ___trash/waste storage near waterbodies

Logging/ Forestry: ___logging yard ___roads/trails ___stream crossings
___forested areas ___exposed soil ___poor roads
___brush/slash near waterbodies

Other: ___*(specify)* _____

D. Land disturbances that affect water quality

1. Do you see evidence of excess nutrients? *(Check all that apply)*

___**Soil erosion:** ___silt ___sand ___soil ___stockpiled soil
___**Evidence of runoff:** ___rills ___gullies ___channel ___sedimentation
___**Evidence of nutrients:** ___pet waste/manure ___fertilizer use ___green lawns other*(specify)* _____

2. Do you see any of the following? *If there are tributaries, catch basins drain pipes, and/or culverts on the site, explain your observation.*

___Tributaries bringing in siltation:_____
___Pipes/culverts (*describe conditions*):_____
- Describe what is going into the pipe *(Add color and odor)*:_____
- Describe any discharge from the pipe *(Add color and odor*):_____

___Full catch basins: full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*

E. Water quality concerns *(Check all that apply, describe the location and cause, and indicate site on map)*

___Oily sheen or smell: _____
___Sewage: *(odor, milky color, toilet paper)*_____
___Foam or scum: (*does a stick break it up? If it does, foam is probably natural.)*_____
___Fishy odor or fish kill:_____
___Algae or aquatic weeds (*excessive growth)*:_____
___Floating trash:_____
___Obvious sedimentation: *(e.g., sand)* _____

F. Habitat and wildlife *(Evidence of…)*

___Fish: (fish, fish nests, anglers) *Identify species if known*_____
___Other aquatic life: __insects, __turtles, __frogs, __snails, __mussels, __clams, other:_____
*Identify species if known:*_____
___Waterfowl: __herons, __ducks, __geese, __loons, other_____
___Areas of good habitat with wildlife: D*escribe*_____

End of Near Shore Area Field Sheets: Skip the next page, go to Pipe, Narrative, Priority & Map Pages

FIELD SHEETS - UPLAND

LAKE & POND **WATERSHED SURVEY** FORM – **UPLAND WATERSHED AREA**

Lake/Watershed: _____ Survey Date:_____
Surveyors' Names: _____ Area Name & Number: _____
Weather Today: _____ Weather – past 2-5 days: _____

A. General Categories of Land Uses in Your Survey Section *(Identify the land use category on the site. May be more than one land use.)*

___ % Construction ___ % Agricultural land
___ % Residential
___ % Roads ___ % *Commercial, Industrial & UrbanAreas*
___ % Other (*please specify, e.g. , rural, open, or recreational)*_____

A.1. Specific Land Use in Your Survey Section *(Estimate % of site in each use. May be more than one land use.)*

___commercial	___dirt road	___protected open space
___industrial	___local road	___undeveloped land
___junk yard	___parking lot	___meadow
___railroad	___golf course	___forest
___bridge	___grazing/pasture	___wetland
___highway	___park or beach	___other *(specify)*_____

A.2. If Residential *(Estimate % of site that is…)*

___Multifamily ___year round
___<1/4 acre lots ___seasonal
___1/2-1 acre lots
___>1 acre (*400 x 100 feet)*

C. Site drainage

1. **Site runoff is directly to…**

___lake ___stream ___ditch ___ catch basin ___vegetated buffer ___wetland other *(describe)*_____

2. **Site runoff from…**

Construction Sites

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Exposed soil and erosion.
___Alteration to drainage pathways or alteration near waterbodies or wetlands.
___Absence or ___*Failure of erosion controls, such as silt fences and hay bales.*
___Evidence of erosion, such as gullies or rills on the surface of the soil.
___*Cloudy or discolored water* in ditches, streams, wetlands, or lake.
___Sediment build-up in ditches, streams, wetlands, or lake.
___Construction on overly steep slopes.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Roads:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Absence of vegetation or buffer between road and waterbody.
___Roads located on steep slopes.
___Street drains, storm sewers, and pipes that discharge directly to streams, lake, or wetland. **See Pipe Survey**
___Full or clogged catch basins? Full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*
___Damaged or eroded pipe or culvert outlets.
___Sediment buildup below pipe or along roadside.
___Washouts and crumbling pavement on roads and sidewalks.

Over

LAKE & POND **WATERSHED SURVEY** FORM – **UPLAND WATERSHED AREA**

C. Site drainage

2. **Site runoff from…**

Roads: ***continued***

___Ditch, culvert, or pipe washouts, undercutting, or gullies and rills along sides and bottom of road or ditch.
___Exposed soil in ditch channel.
___Long ditches without discharge points into vegetated areas.
___Erosion around inlets and outlets of culverts.
___*Washed out or damaged culvert*

**Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.*

Residential areas:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Areas of bare soil.
___Turbid (cloudy) water.
___Evidence of erosion on driveways or other areas, such as gullies or rills on the surface of the soil, or sediment accumulation in ditches and streams.
___Bank instability—bare soil, slumping, or undercut banks.
___Removal of vegetation near shoreline, resulting in increased vulnerability to erosion.
___Absence of vegetation or vegetated buffer.
___Evidence of septic system problems— lawn with green patch, soggy or wet lawn, and/or sewage odor.
___Lush lawns.
___Pet waste.
___Improperly stored trash (e.g., trash barrels or dumpsters) or organic debris (grass clippings, leaves, compost) near a waterbody.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Commercial, Industrial and Urban Areas:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see:
___Street drains, storm sewers, and pipes that discharge directly to streams, lake, or wetland. **See Pipe Survey**
___Full or clogged catch basins? Full with *(circle)*: trash sand pet waste oil other_____
**Note problem catch basins on your map.*
___Damaged or eroded pipe or culvert outlets. ___Sediment buildup below pipe or along roadside.
___Eroded or undercut banks due to increased stormwater volumes and flows.
___Cloudy, discolored, or smelly water in ditches,
___Green scum, oily sheen, or floatables on water.
___Absence of vegetation or vegetated buffer near waterbody.
___Altered and paved areas near waterbodies.
___Trash, vehicles, manure, or waste storage near waterbodies.
___Lush lawns.
___Pet waste problems.

Describe most important issues found in the field in your narrative & on priority sheet and note on your maps.

Agricultural:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see: ___exposed soil ___lack of vegetated buffer between fields and water body
___livestock in waterbody ___ manure storage area not enclosed

Logging / Forestry:

Is there a direct pathway for runoff to reach the lake, streams or wetlands?_____
Do you see: ___exposed soil ___eroding roads/trails ___clear-cut near waterbody/wetlands
___evidence of erosion at stream crossings ___turbid (cloudy) water in stream
___brush/slash near waterbodies

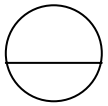
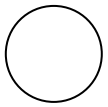
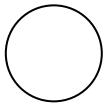
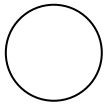
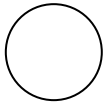
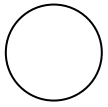
End of Upland Watershed Area Field Sheets: go to Pipe, Narrative, Priority & Map Pages

Lake Watershed Survey of _____ Watershed

Survey Section Name & Number_____ Date: _____ Names of observers: _____

Weather today: _____Weather over past 48-72 hours: _____

PIPES

Pipe#	Time	**Pipe material and condition**	**Pipe size & amount of flow**	**Is pipe a storm drain ?**	**Color/ Odor of Flow**	**Algae below pipe?** Yes No Describe extent	**Sediment below pipe**	**Comments? If pipe should be rechecked-describe location**
Sample #1	9:33 AM	Concrete in good shape	 Constant Moderate Flow 1' diameter	Yes	Red-brown / fetid	Green growth coating rocks across the entire stream width and 100 yards upstream.	Sand accumulation at outfall	Should be rechecked. Downstream of Jones St. Bridge
								
								
								
								
								

Lawns

Tally of lush lawns in your surveys section _____

Roof runoff

Tally of homes with roof drainage to pavement or other impervious surfaces _____

Lake Watershed Survey
Area Summary Sheet 1: Narrative

Date:_____ Survey Section :_____

Surveyors:_____

Today's weather:_____

Weather over past 24-48 hours:_____

These sheets are designed to (1) give the "big picture" of your area, and (2) describe the problems you have seen that could contribute to impaired water quality in the waterbodies of your watershed. The problems you have seen should be marked on your map (A, B, C, D) and described here. Identify the source of the problem whenever possible. This information provides the basis of the narrative description in your Lake or Pond Watershed Survey Report.

NARRATIVE DESCRIPTION

Sample.
We surveyed the south side of the pond from Oak to John Street. **(A)** There is a small stream, (about 1.5 feet across and 0.5 inches deep) that comes in just east of 3 Oak Street. The stream has a deep tea color but does not smell or have any algae. The bottom of the lake in this area is covered with decaying leaves/muck. This area also has woods coming up to the pond edge- a really well established vegetated buffer and lots of songbirds. **(B)** From 3 to 17 Oak Street, people's lawns come up to the edge of the water-no buffer. Some dumping of yard wastes close to the shoreline.

(C) Lots of illegal dumping- at the end of the maintenance access road for Rte. 13 (mostly construction type stuff)! There are 3 large erosion gullies beneath the pipes sticking out of the embankment (from the storm drains on the highway), and there is a large delta of sand forming in the water beneath the embankment. Smells like gasoline and there was a sheen in the water trapped by the tires. This area could be cleaned up and it would make a great boat ramp area. Plant a few trees and it would be a nice place to sit-the view is nice. Can we get permission from Mass Highway to do clean up work near Rte. 13?

(D) There is a thick coating of duckweed along the edge of "Ball Park Cove" and the rest of the cove is thick with milfoil, (a neighbor says it is milfoil-we are not sure). The storm drain across from a new subdivision, (intersection of Oak and John Streets), is clogged with dirt from the construction site.

Describe your area:

MAPPING PAGE

Survey area:_____
Surveyors:_____
Date:_____ Weather today:_____ Weather past 48 hours:_____

Draw a birds-eye view of your problem site, showing vegetation types and canopy along the streambank or shoreline, land uses, and other features. Include any details such as pipes, drainage ditches, or connections to wetlands or tributaries. Add assets such as habitat, recreation, and open space. If there is enough room write a brief description next to the problems found on site. If you need more room, label the problems A,B, C, on the map and describe these problems on the Narrative Summary Sheet. Be sure to include the following information : (1) where you have taken photos --use arrow showing direction, include photo number, (2) Mark problems, assets, and photo numbers on topographic map of your area.

Lake Watershed Survey **Surveyor's Names:**_____

Area Summary Sheet 2: Priorities for Action **Section Name & Number:**_____

Look back at your data sheets and include your observations. The information from this sheet will be used to develop the Watershed Survey Report and Action Plan.

PROBLEMS: Problems found in your area, such as pipes or culverts discharging in dry weather, erosion, runoff, trash, dense algae, water quality problems (odor, color, oil, foam, sewage), and degraded wetlands (phragmites, loosestrife) *(Describe and give location).*	ASSETS: Assets found in your area, such as good habitat, wildlife species, businesses, or landowners using the river (in a friendly way), recreational access (canoe, trails, parks), potential recreational access, and potential park/conservation land, scenic views *(Describe and give location).*	PRIORITIES FOR ACTION: List items from problems/assets columns that you feel need more work.
1.	1.	1.
2.	*2.*	*2.*

Based on sheets provided by the Massachusetts Riverways Programs/DFWELE